

forming an insulating layer extending above [over] said first electrically conductive structure, said insulating structure having an opening with sidewalls and a bottom and [exposes] exposing a portion of said first conductive structure;

providing a halogen-free gas comprised of hydrogen incorporated within a plasma into said opening in said insulating layer and onto the exposed portion of said first conductive layer to increase the reactive surface of any residual material on said exposed portion and at least partially remove said residual material ; and

then depositing a conductive material into said opening and onto said exposed portion using chemical vapor deposition.

REMARKS

Claim 21 has been amended for improved clarity and accuracy. Claims 21 to 32 remain active in this application.

Claims 21 and 24 were rejected under 35 U.S.C. 102(e) as being anticipated by Nakata (U.S. 5,620,925). The rejection is respectfully traversed.

Claim 21 relates to a method of fabricating an electronic device having a first conductive structure electrically connected to a second conductive structure situated over a semiconductor substrate, the method comprising the steps of: forming the first conductive structure and forming an insulating layer extending above the first conductive structure, the insulating structure having an opening with sidewalls and a bottom and exposing a portion of the first conductive structure. The claim up to this point is admittedly old in the art. A principal inventive feature set forth in the claim relates to the step of removing residue from the opening and particularly from the exposed surface of the first conductive structure by providing a halogen-free gas comprised of

hydrogen incorporated within a plasma into the opening in the insulating layer and onto the exposed portion of the first conductive layer to increase the reactive surface of any residual material on the exposed portion and at least partially remove the residual material and then depositing a conductive material into the opening and onto the exposed portion using chemical vapor deposition. The advantage of this type of chemistry is set forth on page 5 of the specification which is that high ion energies are not required in accordance with this procedure, thereby reducing or eliminating the undesirable deformation of high aspect ratio features or topologically sharp features often associated with modern semiconductor devices. As stated at page 3 of the specification, the prior art utilized chlorine or bromine (halogen) chemistries that provided serious problems which are overcome by use of the chemistry of the present invention which is halogen free.

A review of Nakata clearly indicates that the chemistry used is the undesirable prior art chemistry mentioned in the subject specification, namely halogen chemistry, halogens being lithium, chlorine, bromine and iodine. The use of a halogen-free hydrogen plasma chemistry is nowhere taught or even remotely suggested in Nakata et al. In fact, as previously stated, the use of hydrogen chemistry in the manner claimed is nowhere taught or suggested by Nakata et al. The Examiner has still failed to show exactly where in Nakata et al. such procedure is to be found. It follows that the inventive concept of the claims on appeal is nowhere taught or even remotely suggested by the cited reference to Nakata et al.

Claim 24 depends from claim 21 and therefore defines patentably over Nakata for at least the reasons set forth above with reference to claim 21.

Claim 24 further limits claim 21 by requiring that the conductive material be comprised of a metal selected from the group consisting of: aluminum, copper, titanium, and a combination thereof. No such combination is taught or suggested by Nakata.

Claims 21, 23, and 25 were rejected under 35 U.S.C. 102(e) as being anticipated by Taguwa (U.S. 6,020,254). The rejection is respectfully traversed.

The declarations of Barton E. Showalter and Christopher W. Kennerly, previously filed, demonstrate a conception with diligence up to the filing of the provisional application (Serial No. 60/033,728, filed December 20, 1996) upon which the subject application application is based which predates the filing date of Taguwa (November 21, 1996). Note that activity toward preparation and filing of the subject application commenced at least as early as September 17, 1996 with continual activity thereafter as required under M.P.E.P. 2138.06 as expressed in Keizer v. Bradley, 270 F2d 396, 397, 123 USPQ 215, 216 (CCPA 1959) and Emery v. Ronden, 188 USPQ 264, 268 (Bd. Pat. Inter. 1974). Accordingly, Taguwa is not available as a reference in this application. With reference to the "comments from the inventors" as mentioned in the Office action, attached hereto is a further Declaration of the undersigned attesting to the fact that, on information and belief, the original invention disclosure mentioned in the Declarations of Christopher W. Kennerly and Barton E. Showalter contains that which is claimed and disclosed in the subject application, a copy of this invention disclosure with dates redacted being attached to said Declaration. It is clear that the "comments from the inventors" in no way added to the invention as claimed herein.

Claims 21, 22, 26, 29 and 30 were rejected under 35 U.S.C. 102(e) as being anticipated by Park et al. (U.S. 6,051,492). The rejection is respectfully traversed as Park et al. is not

available as a reference in this application for the same reasons as presented above with reference to Taguwa.

Claims 27, 28, 31 and 32 were rejected under 35 U.S.C. 103(a) as being unpatentable over Park et al. in view of Pan et al. The rejection is respectfully traversed since Park et al. is not available as a reference for reasons stated above.

In view of the above remarks, favorable reconsideration and allowance are respectfully requested.

Respectfully submitted,

A handwritten signature consisting of the letters 'J' and 'G' connected by a horizontal line.

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